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THE PECAN

The pecan, Carya illinoensis, is native only to North America and belongs to the walnut family, Juglandaceae. It is closely related to the various species of hickories and is, therefore, assigned to the genus Carya. This tree produces nuts of good flavor and has high oil content.

The pecan has three important values: (1) commercial production of nuts, (2) production of nuts for home use and wildlife, and (3) use for shade trees and ornamental plantings.

Indigenous Range

The pecan is native on the alluvial soils of the bottom lands of the Mississippi River and its tributaries, and certain of the rivers of Texas. Its northern limits are in the vicinity of Clinton, Iowa, and Terre Haute, Indiana, and it extends south to near the Gulf of Mexico and southwest to southern Texas. There are no pecan trees known to be indigenous east of the Ohio-Indiana State line and none in eastern Kentucky, eastern Tennessee, or in any of the Atlantic Coast States. Pecan forests are common in eastern Missouri, eastern Kansas, eastern Oklahoma, and Arkansas. None are found in western Texas or nearer than 50 to 75 miles from the coast of the Gulf of Mexico. Extensive stands of pecan seedling trees are to be found in the river valleys of northern Mexico, where pecan is believed to have been introduced from Texas many years ago.

Climatic Requirements

Most pecan nuts produced in the United States are grown in areas where there is a growing season of more than 200 frost-free days. Pecan does best where the summer temperatures are uniformly high with little change in day and night temperatures. For that reason it is largely grown in river valleys and at low elevations. Under mountain conditions, where there is generally a considerable difference in day and night temperatures, the trees grow slowly and the nuts mature slowly even though the usual day temperatures are high. For normal tree growth and fruiting, the pecan requires a hot growing season as does corn and cotton but the season must be much longer.

The pecan tree requires about 800 hours of cold or chilling temperatures (45° F or lower during the winter) - a much smaller amount than most deciduous fruit trees. In areas where somewhat less winter chilling is experienced, the



trees start growth in the spring much later than they do when they have received an adequate chilling. In addition, under conditions of inadequate chilling, flowering and fruiting of bearing trees is not normal. The trees are very slow to start growth in the spring even though there is an adequate amount of chilling temperatures. The reason for this is the large number of heat units required to initiate bud growth. Pecan trees, therefore, are much later in leafing out in the spring than are most other deciduous trees and shrubs.

When fully dormant, the pecan tree is very winter-hardy and can withstand a temperature of minus 25° F or even lower without injury. On the other hand, when in active growth, the trees are rather tender and may be badly injured by temperatures only a few degrees below freezing. Since the pecan tree starts growth so late in the spring, usually after the danger of late freezes have passed, the trees are seldom injured and the crop is seldom destroyed by spring freezes. Early severe freezes in the fall are more likely to injure the trees and to destroy the nuts before they are mature. The pecan tree is subject to making second growth in late summer or early fall, especially if the temperatures remain fairly high and heavy rainfall occurs after a period of dry weather. Severe freezes when the trees are in growth and before the wood has hardened are likely to result in the new shoots being killed back. The bark at the crotches of the limbs, on the tree trunk, or at the ground level may be loosened. Unless the nuts have matured to the extent that the shucks have loosened, they are likely to be destroyed by a severe freeze in the fall.

The pecan tree is a heavy user of water because of its large leaf area. On deep soils with high water-holding capacity and little run-off, an annual rainfall of 30 to 35 inches seems adequate. On shallow or light-textured soils, a well distributed rainfall of 40 to 50 inches is required or that amount of water must be supplied by irrigation.

#### Possible Cultural Range

The commercial pecan crop is produced over a wide area of the United States. Most nuts from budded trees are produced in orchards planted outside of the area in which the pecan is indigenous. These orchards are located in the coastal plains or piedmont areas of southeastern Virginia, eastern North Carolina and South Carolina, Georgia, northern Florida, Arizona, New Mexico, and Alabama. By far, the greatest acreage of pecan orchards in any one section is in southwestern Georgia and in the vicinity of Albany, Georgia. Georgia produces about one-half of the total crop from budded trees. Texas and Louisiana are the leaders in the production of seedling nuts, but other important States are Oklahoma, Mississippi, Arkansas, Missouri, and Illinois.

Most commercial orchards consist of varieties that have been selected from seedling trees growing south of latitude 33° in the Deep South or they have had such a parentage. Such varieties require a very long growing season of uniformly warm weather and are, therefore, not suited for culture under northern conditions. To extend the cultural range, selections have been made from native seedling trees growing under more northern conditions and at



latitudes of  $37^{\circ}$  or farther north. These selections have resulted in many varieties that require a much shorter growing season to mature their nuts than those originating in the Deep South. Hence there are now three groups of varieties: southern, western, and northern.

Even with the northern varieties, pecan nut crops are distinctly uncertain at latitudes greater than  $38^{\circ}$  or at elevations greater than 1000 feet except in central and western Texas and Arizona. Crops from forest trees are of sufficiently frequent occurrence as far north as latitude  $41^{\circ}$  in the Mississippi Valley to reproduce the species abundantly. In addition, trees planted outside of the native range of the pecan have matured nuts in Wisconsin at a latitude of  $45^{\circ}$  and in Michigan at  $42^{\circ}$  in years of favorable growing season and late fall freezes.

#### Varieties

Since 1900, a rather large number of pecan varieties have been propagated. Most all these varieties have come from chance seedling trees growing in the wild. These varieties were selected for the high yields of the original trees, for the thinness of the shells, the good cracking quality of the nuts, and the well-filled, bright kernels produced. Although many varieties have been propagated and widely planted, most of them have become obsolete because of undesirable characteristics such as susceptibility to diseases, poor yields, or poorly filled nuts. The varieties mentioned are those that have been found to be best suited for culture in the particular area in which they should be grown.

Southern. The Stuart variety has been more extensively and widely planted than any other. It has been very popular as a commercial variety. Other varieties worthy of planting are Desirable, Farley, and Elliott. The Curtis variety is very disease resistant but bears small, thin-shelled nuts of high quality. Because it matures late in the season, Curtis should be grown only in the Deep South.

Western. In the dry areas of Texas and other western States where pecans can be grown, the Western (western Schley) and San Saba varieties are suggested for planting.

Northern. All of the northern varieties have originated from chance seedling trees found growing at latitude  $37^{\circ}$  or farther north. Of all the northern varieties so far introduced, Major is probably the most widely planted. It originated in Henderson County, Kentucky, latitude  $37.75^{\circ}$ . It is popular because it bears well and matures nuts where others fail to do so. A new variety known as Peruque that originated in Peruque, Missouri, has become popular because of its early and heavy bearing and excellent, thin-shelled nuts. Others that are in favor at this time are Indiana, Posey, and Busseron. Elmer was probably the most northern variety introduced. The original tree grew in Burlington, Iowa, at a latitude of approximately  $40.5^{\circ}$ .

There were other varieties originating in Iowa at somewhat the same latitude but they, as well as the Elmer, failed to become important. The variety Norton, originated in Pike County, Missouri, at a latitude of  $39.5^{\circ}$ , was considered by some growers to be promising for northern plantings but this



variety has been propagated very little.

The Starking Hardy Giant variety, Plant Patent No. 1361, originated at Brunswick, Missouri, at latitude 39.5°. The nuts are oblong and are, therefore, highly suitable for mechanical cracking. The shell is thin, cracks easily, and releases the kernel well.

#### Cultural Requirements

Soils. The pecan tree can be successfully grown on a wide range of soil types. The soil should be deep, well-drained, and well supplied with moisture throughout the year. Pecan trees do best when planted deep in a fertile, sandy loam with a friable clay subsoil where the roots can readily penetrate and which permits the drainage of excess water to depths below the roots. The pecan tree normally develops an extensive taproot when grown on suitable soil. Under such conditions, this taproot will extend to depths of 20 feet or more. Shallow soils may sustain a tree for several years, but for extended tree life, the subsoil should permit rooting to a depth of 10 feet or more.

The soil must drain readily although it should have a fairly high water-holding capacity such as that of a loam. Although the native pecan trees are found growing in river valleys, the soil on which such trees grow is well-drained and aerated. The root system cannot tolerate a soil that is water-logged for a long period especially when the trees are in leaf. The trees are not harmed by overflows or floods provided the water recedes within a week and the soil and subsoil drains quickly. In some cases the heavy deposit of silt during a flood has caused injury to the trees but if the deposit is 3 inches or less it usually does no damage.

Planting. Pecan trees are difficult to transplant because a nursery tree generally has a large taproot that carries few lateral roots. A nursery tree should be dug with a taproot 2 to 2½ feet long. In transplanting make the hole deep enough to accommodate the roots. The tree should stand 2 or 3 inches deeper than it stood in the soil in the nursery. In refilling the hole, only good fertile soil should be used. This soil should be firmly tamped in place as the hole is refilled, or water should be applied to wash the soil in place. After the tree has been planted, the top should be cut back to a height of 2 feet. It is best to wrap the tree trunk with several layers of newspaper or similar material to within 4 or 5 inches of the top. Tie these layers loosely in place and leave them on for at least one full year. This wrapping of the tree trunk helps prevent loss of moisture from the tree, reduces likelihood of borer infestation, and prevents sunscald.

Culture. Following transplanting, pecan trees are slow to start top growth in the spring and often they make little growth the first year. This is because no new root growth is made to replace the roots destroyed in transplanting until the top begins to grow. Therefore, newly transplanted and young trees must be cultivated to prevent grass and weeds from competing for moisture and nutrients from the soil. An area at least 10 feet in diameter around each tree should be kept cleanly cultivated from the time growth starts in the spring until the first of August. After the first of August, grass and weeds may be permitted to grow but spring and summer cultivation should be made for



the first 3 years. Most failures in establishing trees are caused by competition of grass and weeds.

Fertilization. In spring, after the transplanted tree has started to grow, 2 pounds of a 5-10-5 fertilizer should be broadcast evenly in the area 4 feet in diameter around the tree. Thereafter, this rate of fertilization should be increased by 2 pounds each year; that is, a 10-year-old tree should receive 20 pounds. The fertilizer should be applied in the late winter or early spring. In some cases and on certain soils, young trees may develop rosette, a diseased condition caused by a deficiency of zinc. This condition can usually be controlled by applying zinc sulfate to the soil.

#### Disease and Insects

When grown outside of their native range, individual pecan trees are often relatively free of insect or disease damage. However, in areas of commercial production, insects and diseases become serious and unless controlled, often destroy most of the nuts. There are a number of these insects and diseases that individually or collectively cause losses in nut production.

#### The Tree

The pecan tree, when located on suitable soil and under favorable climatic conditions, attains a very large size. Once established, young trees grow fast making 2 feet or more of new growth each year. In the South, trees have attained a height of 120 feet or more with a limb spread of 100 to 120 feet or more and trunk circumference of 15 feet. Even under middle-northern conditions, the trees attain large size. Because of this, permanent trees should be planted far apart for adequate space in which to develop without being crowded. Too often, the mistake is made of planting trees too close to other trees or buildings.

#### The Value of the Pecan

Many farms and country homes without pecan trees have suitable climatic conditions and soils on which the trees could be grown and nuts produced successfully. There are few other trees that can be grown over such a wide area of this country as the pecan and that can contribute so much. Among these contributions are breaking the impact of winter winds, providing shade from the heat of the hot summer sun, furnishing food for home use and wildlife, and providing rural beautification.

Except in the Deep South, pecan trees have not been widely used as shade trees or for ornamental plantings. It is a magnificent tree when in full leaf and is equally stately when dormant. It is strong and tough when well grown. It withstands high winds and the trees are hardy. Much greater use should be made of the pecan tree for shade and ornamental plantings, even in areas where climatic conditions are likely to be unfavorable for production of the nut.

